GB-443-ONR

Bahamas 1964

Once more in this land of incredible blue water. Three years it has been. We didn't plan it that way, but that is the way it happened. All things about the same except that Lyford Cay has settled down to being completely exclusive. Gateman gave us a very stern look when we arrived in our messy station wagon. We appear to be accepted now (tolerated), as poor relations who managed somehow to slip in when the door was unguarded.

The crossing was rainy, but not rough. I believe it rained all night -- first time such a thing has come to pass on a run over. But nobody seemed to mind, and there was always a dry spot somewhere on the boat. Always some minor crisis -- or several -- to this sort of thing. When we took the car down to the docks in Miami at noon of Friday, June 5th (as we had been instructed the day before) the freight man said tersely that it couldn't be shipped. The boom was broken for lifting it aboard; it would have to wait several days. After many words in many offices and hasty arrangements with another boat company to haul the car on <u>their</u> boat, our boat people suddenly decided that the boom would be mended in ample time, there would be no problem, the car would go as scheduled. And so it was. I could see nothing wrong with the boom when it finally was put to use. Some of these things are beyond explaining. Certain it was that we could not have managed if all of our underwater gear were to have remained in the car on the docks of Miami.

When we cross to Nassau we usually plan not to land on Friday because all of the stores close on Friday afternoons. No groceries for a bare

pantry if we get hung up at the dock. Saturday is almost as bad. All banks and government offices close on Saturday afternoons. This whole situation has given rise to stirring times for people who pull in on a weekend. We came on Saturday. This meant that any traffic with the government must be out of the way by noon. All went well -- though at the usual snail's pace -- with the baggage checking; (a new wrinkle: we must post a ten dollar bond that we would bring our fox terrier puppy out again with us in August). After rushing uptown to the steamship company for the car papers, back again in another direction for freight receipt, the way appeared to be clear until the last official decided that I must make a five hundred dollar cash deposit on the automobile. It was eleven forty-five, my traveler's checks were not sufficient to cover, I had no account in any of the banks. This is where the scrambling began. After some fast legwork I found a friend who called the bank to assure them that if I opened an account my checks would not bounce. The bank kindly remained open for a few extra minutes to put the transaction on paper, the bond went to the customs people, the final signature went into the final customs paper, and presto, we were in! But it had been a near thing. I had expected to spend the weekend at Lyford with the car locked up on the docks.

The other crises were routine: an inch of water on the floor of the rented thatched-roof house -- (because it had been raining and the man who had been mending the thatch had left it with gaping holes); an automobile engine that for no understandable reason began clattering suddenly (it had been completely overhauled before leaving Texas) and turned out to need a

new cam shaft and a new cylinder head.

But all things eventually straighten out. The boys and I put up a polyethylene tent and workshop under a cover of sea grape trees in the back yard, built a worktable, shelved the thing with liquor boxes, set up the drill press, and the other necessary tools, piped in electricity, and we were in business. We have built underwater lights now, completed the still camera housing, made underwater tests (on the 19th); the car is repaired, the boys have been collecting. Soon our days will be underwater.

June 21st. Three full days of rain. The weather people say we are in the midst of an easterly wave. I hope that it begins to wave off in some other direction before long. For one thing, I have been set for undersea tests with the motion picture and still cameras both at the ready. But no sun. The 16-mm film I have (Ektachrome Commercial) is too slow for shooting without the help of full sun. Stills could be shot completely with flash, I suppose, but the flash is intended only for fill-in. So we have held our fire. Also the natives insist that being out in an open boat in the midst of one of these thunder storms (there is a good deal of electrical activity all day long) is not a good idea. Several island fishermen are killed by lightening every year.

The reeflets in Lyford Bay are retreating every year. Before many years nothing will be left of them, I'd imagine. In '61 we had to move closer to the mouth of the bay to find a suitable spot, and this had been an outward move from the time before. We find now that the coral heads of '61 are masses of half-dead coral, the plumes of the gorgonians are

gone, with only a skeleton here and there to show they existed at all. I wonder if this is natural retrogression from the time of the hurricane that made Lyford Cay a part of the main island in the 1800's, or if man has had something to do with it. Possibly a little of both. Certainly the boat canal that was dredged in the eastern part of the bay, with the months of silt-laden water that resulted from it did not help the coral. It will take some looking to find a reeflet to use as a base for this year's operations.

During the periods between squalls the boys collected hermit crabs and other inverts. The big hermits are in our pen at the end of the dock. Most of the other specimens are in bottles -- except for those in Christy's aquarium. He has a fifteen gallon tank that we wheedled from Miami, and after patching the leaks he set it up under the protection of the thatched porch, covering it with a piece of corrugated cardboard. He made the mistake of setting things on this cover, and the first shower of rain one night soaked the cardboard and dropped it and its contents into the aquarium. Among other things on the lid was a small puffer in an open jar of formaldehyde. This brew finished off his little octopus, several stomatopods, a cone, some swollen eggs, and his planting of turtle grass. Now we will have to start over. This time he has a board cover.

The porch is not the only part of this house that lets in water. In fact, it comes in almost everywhere. During each heavy rain we have towels spread at selected spots around our bedrooms in an effort to soak up some of the rain that comes in. The fellow in Nassau who has the responsibility

of looking after this house is very pleasant, makes the most iron-clad promises about having the leaks mended -- and does absolutely nothing. Probably he feels that the owner (who lives in Edmonton, Canada) is being swindled out of a just rental for it this summer. The house is one of the oldest at Lyford, with thatched roof and outer walls, and so simply built that until recent years it never was considered as a house, but a beach cabana to be used on weekends by the wealthy people in Nassau who owned it. It is square as a cube, with a peaked roof, three bedrooms and a kitchen, each about the size of a walk-in closet, and in the center a larger room with tile floor opening through wall-size screen doors to the flagged terrace partially roofed with thatch. It faces directly on the beach, and there is a dock. It is a charming, rustic place, with the sea breeze blowing through it and the expanse of sea just beyond. I should be surprised if it cost two thousand dollars to build it. Now in winter it rents for twelve hundred dollars a month, and in summer it is supposed to go for six hundred; but we are stealing it for three hundred because we are doing scientific research and the owner feels that she wants to contribute something to the project. She could contribute even more by having the roof mended. If this rain continues I'll go up with a bundle of palm fronds myself.

We have something of a mystery for which I must find the answer. Our neighbor over on the other side of the point insists that something lives in close association with the black urchins in her rocky bay. She speared a batch of them to clear a path to deeper water and insists that

something red dashed away from each skewered urchin. I asked her if it could have been a small crab. She said no, it was more like a polywog with a tail on it. Drew a picture on the sand as an illustration. So this afternoon I gathered some of her urchins, and have them in a bucket on the porch. Nothing has come out of any of them so far. And nothing fled from those we speared at the same time. I told our neighbor that possibly what she saw was a figment. I hope not. I hope it is something more tangible -- and something that can be photographed. We shall see.

The motion picture camera with the 100-mm lenses now is ready to record very small things. I have extended the lenses with half-inch tubes, giving me a field of one-and-one-quarter inches at a distance of about fifteen inches. That puts the infinity of that camera at about three feet, but I can use the wide-angle camera for things that require the long view. Now if my camera stand is steady enough to hold down vibration it should be possible to do some very fancy shooting.

But aside from the rain, we are handicapped by having only one boat. This lack has not been serious up to now, and Mr. Francis (the man who has charge of the house and its upkeep) has been promising to let us use his boat for the summer -- charges unspecified but presumably low. Some sort of work must be done on the boat first, however -- this work also vague in character. Somehow the work is never finished. "Just a few days more" is the usual answer. Today the propeller flew off the boat we have. Luckily it did its flying in shallow water and the boys recovered it. But the nut that locked it on was not to be found. They went to

town for replacements, taking measurements with them. The nut they returned with would not fit. I immediately phoned the boat people. Nothing can be done until tomorrow morning. This time the boys will take in the entire motor.

And our main supply of film does not show up. It was to have been in Miami when we reached there early this month. But it wasn't. The last letter I had from Dr. Schmitt stated that it had been shipped by air on the 16th in care of the American Consulate. Nobody there knows anything about it. I phone them every day. Today I began calling Pan American Airlines. They don't know anything about it either.

June 28. Three more days of rain, until everything has become a sodden mass. A tub out in the yard in the shelter of a tree held seven and a half inches. At last the sun. We put the final touches on our undersea enclosures and after much searching decided on a site for them -- a coral head far out near the opening of the bay. We should have preferred working in the area where we expect to find most of our stomatopods, but the water is continually murky, there is much current, and too much boat traffic. All of these things decided us to set up shop in an area not too far from the formation we used the last time we were here. The 1961 formation had deteriorated too much for considering it, and we are using the head that I worked around in 1954.

It was interesting to notice how the formation had changed in the intervening ten years. One mound of star coral appeared not to have altered in the slightest. A ragged hole in one side had sheltered an octopus that summer. As far as I can tell the cleft is exactly as it was, and I half

expected to see the same octopus in it, snuggled back half out of sight. But he wasn't there, and the red sponge that had been a knob four inches high now extended a foot or more beyond the opening. A colony of anemones on one face of the coral mound appears to be about the same. A cave at the base of one boulder which used to be the daylight sleeping place of a five-foot nurse shark was vacant of shark but occupied by a lobster. There were several large ones in it, as a matter of fact, and they each and severally pointed their antennae in my direction whenever I came by, like cows facing a strange dog. And then one of them batted me on my bare shins (much to my surprise), came completely out of his hiding place, ambled up the side of the mound of coral, and disappeared into a new den. This action made no sense to me but it may have held some meaning for the crayfish. I gave him a chance to repeat his performance by putting my hand up to his antennae in the new shelter. But he only backed off out of sight. One piece of bravado was enough for one day, probably.

The only really conspicuous change in this bit of reef is the lack now of gorgonians. There used to be some fine growths of plumes and many sea fans. Now there are two purplish fans only, and no plumes at all. They seem to be the first things to go when the little reefs begin to deteriorate. I wonder why.

The fish population appears to be in pretty good balance. Many grunts, squirrels, three-spotted goatfish, and parrots -- these so far have been quite timid, and I have been able only to see them back among the rocks. They will come out soon, I should imagine, as soon as they realize that

Tom and I have no evil intentions. There is one rock beauty, a single queen trigger, and one small queen angel. No grouper -- at least none in sight -- but a coney or two and a small hind. No eel, but likely there is one or more back among the boulders.

We have set up our main shooting enclosure at the south side of the reeflet to take the best advantage of the sunlight, have laid in a covering of good sand, not too white, as a flooring over the grass stumps (we had to dig out a sod of turtle grass in the area) and have typical reef formations in the enclosure so that any inmates will feel at home. This was completed on Saturday, and as a starter we put into it a big hermit crab -- about the largest one I ever have seen. Monday we will try to get him to change shells with a smaller crab that has a larger shell than he needs. This big hermit is an occupant of a shell so small that when I picked him up out on the grass flats he immediately abandoned it as being of no value at all, and tried to bury his tailend in the grass. It was a silly performance, and I finally convinced him that he should take back his small house -- at least for the time being. That was several days ago and he has stuck with it since that time. Probably by now he is reconciled and won't leave it atall. We shall see.

No further information on the red things that associate with the urchins. I sent Chris over to the neighbors with instructions to float around in the water observing the urchins until he could come back with an explanation. He returned several hours later. He saw nothing except some demoiselles with a reddish spot on the front of them. He thinks

possibly our neighbor saw only that part of the fish. She says no, she can see better than that. Figments.

June 29. Determined to have a full day of shooting today. The hermit crabs to be the subjects. Had not tried out our diffuser -- this year we had made a very large one, using a translucent poly-vinyl material that appeared to the eye to be about the right thing. Twelve by twenty feet, fastened at the ends with 1x2's twelve feet long, with anchor ropes. Found it to be extremely difficult to handle under water. When it was unrolled it billowed like a sail, and had pull enough to move our cement blocks. And then we looked at the shadow it cast... black as ink. And that was the end of that. Rolled it up, carted it back home, and made another one -- twelve by twelve feet this time -- of the same material I have used in other years. It is some sort of poly combined with rubber, and has a frosty, ground-glass look to it. I had thought it a little thin when we used it last time. But it is tough. Trouble is that this stuff is only forty inches wide so we had to make the diffuser in overlapping strips, hoping that they wouldn't come open at the seams in use. Took it back to the shooting area. Light too far gone to do any shooting.

June 30. Very pretty day. Got going without trouble. The very big hermit crab will not perform. He will not dig in the sand the way his fellows do, and he is uninterested in any other kind of food. All he cares about is travel, and the only thing that stops him is a solid wall. I tried him with several pieces of minnow. He knocks them away with his big claws and stomps off.

We put him back in the holding pen with the other crabs and used a smaller one as a subject. He dug in the sand very beautifully. This is a very complicated procedure. The crab works the sand with his long slender legs, scooping it towards his mouth, and finally the sand and stones and pieces of grass shoot out like chaff from a threshing rig. From time to time, as the pile gets too big in front of him, he levels it off with his big claws. We did film of this operation, and I was especially taken with the close-ups made with the big camera. Tried some scenes with fill-in from our battery-operated bulb.

Shortly before noon I had finished shooting both cameras. Tom showed up with a rupture in his reserve hose, bubbles cascading out of it. So he had no reserve air. No method of repairing it in the boat. When we had gone to shore, repaired the leak, and changed the film in the cameras I found that I had been shooting without film. Big deal. First time that has ever happened. Shall try to see that it is the last. Must shoot the close-ups of the crab over again.

July 1st. Our film has come! Since it was delayed in Washington it was sent here in charge of the consulate. But although shipped on the 22nd by air we couldn't discover it anywhere on the island. We have been pestering all airlines and the consulate for days. Turns out the packages got delivered to the navy. I can't imagine why. But they were brought to the correct destination eventually. Now I have two thousand feet of Ekta Commercial and the Rollei housing from Smithsonian. Unfortunately, the housing is minus the batteries and necessary attachments, so I'll have to figure some out. In my spare time.

Tom and I did pictures of crabs until noon, and then went in for the film -- and sent off our first shipment.

July 2nd. Fine day. Made minor corrections in the camera boxes -- small leak around the motor mount on the big housing, sticking shutter release on the still box. Spent the day trying to learn how houseless hermits behave. They do not all act alike, of course. Our old Grand Dad behaved true to form, being completely uncooperative. We got him out of his shell by inserting a wire (piece of coat hanger) to tickle his tail end. He couldn't stand it. The only shell his size we could find had a conch in it. Wondered if he could subdue a conch -- it was a big one. He couldn't. He tried several approaches, sometimes tackling it at one end, sometimes at the other, sometimes lifting up one edge to peek under. Every time he raised the shell the conch would lash out at him with its operculum. Aware of his bare condition the crab appeared not to relish being a target. Before long he gave up the whole business, backed over to a coral ledge, and buried his tail under it. He would have nothing more to do with the conch.

We have several crabs in the big pen. We tried to convince one of them that it should try to take the shell away from another one (we had dispossessed the first one). No sale. Tried several times with several crabs. The naked crab simply wandered around. Sometimes would make a pass at one with a house, but his heart appeared not to be in it.

Later we took the shells away from two crabs of equal size and replaced one shell where they both could see it. No battle. The first one to

thrust his tail into the shell galloped off with it. The same thing happened even when we made the contest one-sided by using old Grand Dad as one of the contenders. But while I was up in the boat changing film Tom reported that two crabs met, and one with a large and apparently first-class shell forced the resident of a moth-eaten pint-sized shell out of his house, jumped into it and ran off with it. Some of these happenings never make too much sense.

I think we are about through photographing hermits. With a little care we caught a middle-sized spiny lobster and put him in the shooting pen. I should like to report his method of protecting himself with his long feelers. I was surprised to learn that almost all of the lobster's sensory apparatus (as far as smell is concerned) is centered in the hairs on its feet. There are many lobsters on our reeflet, and I have touched the feelers of all of the lobsters with minnows, and have not received the slightest note of interest until the fish has come in contact with the animal's feet. Then it practically lifts off the bottom. It will follow the minnow held in the fingers right out into the open if it can get an occasional touch on the feet. There is one big lobster with broken-off feelers that will not play the game, of course. He simply bats me with his stumps and will not allow me to come anywhere near. Smart fellow.

July 3rd. Our crawfish had made a nice home for himself under a rock in our main enclosure, we found this morning. So we placed the glass sides on it, not so much to keep the lobster in as to keep intruders out. When all was ready I reached in with a bit of fish after having buried bits of it in the sand in front of the lobster. He whacked my wrists with his

feelers, but by being careful I was able to touch his foot-hairs with the fish. At once he came charging out of his den, and practically ran up my arm after the food. When he had put it up to his mouth he was still so enthusiastic that I must push him backward by the feelers to keep him walking out of the pen altogether (we did not have a front glass on it). But when he realized that there was more food in the sand, he went after it with great enthusiasm, probing the sand with all his front feet at the same time, and when he found something edible he would make a basket with the ends of several feet and lift it to his mouth.

The lobster was not shy in the least, and it was possible to bring him out for pictures at any time. Consequently we ran film with the wide-angle camera, and some with the long lens. With the latter I could photograph his eyes only, or one foot scrabbling in the sand with its long hairs sticking out almost like quills, or fill the field with a view of his face. A lobster is quite an impressive fellow close up. Would do nicely as a monster in some horror picture. His mouth looks especially fierce.

After finishing with him we put the screens back on the enclosure in case we thought of something else that he could do for us -- for instance, I should like to find out what he eats normally and watch him do it. I should like also to record his method of protecting himself. I am sure that he battles with his feelers. If he uses them with decision I am certain they would be quite effective.

While we were putting the screens back on, a moray swam up and tried to enter one of the screened sections. Seeing no reason why he should not be allowed to be our guest, I opened the screen for him. But then he

moved on and did his best to get in through another screened opening. When we opened that one also, giving him an opportunity to enter at any point, he lost interest in the whole business, and slid out of sight under a big boulder, staring balefully out at us. Morays appear to be peeved most of the time. But they rarely do anything about it.

July 6th. After our two-day holiday with everybody rarin' to go, how should it be but the wind in the direction that brings bad weather -- west -- and heavy clouds on the horizon. Although it was on the edge of raining, sent Ned and Chris out to find some stomatopod locations in isolated spots where we could base our shooting operations and put an enclosure around the subjects if we wished to do so. Then Tom and I dug in the sand for clams, with our lobster friend in mind. It was low tide and we could find nothing on the beach so we moved into the water. Finally came up with some half-inch corbulas. They would do for a test.

Later we checked the stomatopod locations the boys had marked, and found one of them to be excellent -- a small piece of decaying coral a foot across with some holes in the upper side. A green stomatopod was waiting for us, and the moment I put down a piece of fish he rushed out and grabbed it. But I held on to the other end so that he couldn't take it and fill his stomach. He pincered off a few shreds from the tail of the little minnow I was holding. Then I tried him with one of the corbulas. He wrestled with it like a man with a beach ball, turning it over and over in his arms. Although he appeared unable to break into it he would not allow me to take it back. Each time I tried to he would rush out and whack my finger. He seemed to feel that he had a prize. Perhaps he can use it as a door plug.

On the bottom near the stomatopod den I noticed an algae-covered clam shell that had the look of having been moved -- the silt was distributed around its edges. I had the feeling that it might be a trap-door or something. And when I tried to turn it over it refused to turn, and would snap back again into its original position. The reason for this peculiar behavior was the little crab who was using the shell for a bonnet. First one I have come across this year. When I carried him up to the boat he would raise his lid from time to time to see where he was being taken. I hope we can keep him in good condition until there is some sunshine so that we can remove his hat and watch him put it back on -- observed by my long lens.

When we went out to the shooting area later in the day -- still no sun -- we took the crab along, and some of the corbulas for the lobster. That fellow was walking around on the sides of the enclosure when we arrived, probably feeling hollow in the stomach after two days with nothing to eat. After depositing the crab in another pen, I offered the lobster a couple of minnows. He took them from me with great enthusiasm, hoisting them to his mouth with basket of legs. He tried to do the same thing with one of my fingers, but I discouraged this. I think he has teeth.

At first he paid no attention to the corbulas -- I offered him only one, actually -- preferring minnow. But when there was no minnow he basketed the little clam and hoisted it to his jaws. It disappeared, and a moment later bits of shell floated to the bottom. Apparently the lobster has a working knowledge of how to eat clams. If he doesn't have teeth he has something that serves as a good substitute. I shall take

care of my fingers even better in the future.

Since it was afternoon with the sun masked by thin clouds I moved to the western edge of our reeflet where the anemones are, and photographed some of the cleaners in action on the big-eyes, hoping that there would be sufficient light. These round anemones carpet the entire western edge of our out-cropping, and at almost any hour of the day one can see big-eyes or conies or an occasional hind either resting on the anemones (a sort of feather bed) or hanging just above them. The shrimps that live in the anemones appear at first glance to be yucatanicus, but some of them are so small as to be all but invisible. I should not be at all surprised if there were several species represented. Certainly they all spend much time cleaning fish. Sometimes they work hand in glove with a neon goby or two. I have seen goby and shrimp under the same gill cover at the same time -- and no bickering. I had not realized before that the yucatanicus is such an active cleaner. These fellows are busy with customers most of the time. Before we leave I shall have to sacrifice the lives of a few of them -- but I shall put off the day as long as possible.

The big-eyes appear to be very conscious of territory. Each fellow keeps to his own premises. When one oversteps a boundary each fish makes jerky sidewise motions with its head, and its normal red body goes to splotchy silver stripes, on a red ground. And to add emphasis its nose and forehead turn chartreuse. That should be signal enough for anybody.

July 8. Sometimes all things conspire -- but not necessarily for good. This is especially true in working undersea, in my estimation. There are so many things over which one has no control, so many cog wheels and so

many wrenches at hand to be thrown into them that I sometimes wonder that any wheels at all ever are turning freely.

This morning thunderheads ringed the horizon, and after a stormy night that blew rain under our thatching and onto our beds and smashed the plate glass top of the table on the terrace (its umbrella somehow lifted out of its socket and came down on it). But Tom and I ran out to the reeflet anyway, and miraculously the clouds failed to gather -- at least they did not get in the way of the sun. I left Tom in the boat to watch the approach of a squall that appeared to be moving in. All was well on the bottom. Our little crab was in its cage with its claws hooked in the wires, shell on top like a small biscuit. The lobster was exploring the sandy bottom of its enclosure.

I had looked briefly at these things, checked to see which of the big-eyes was having its scales cleaned, when I saw the keel of a boat moving in, and a slowly turning prop. Somebody was paying us a visit. The rounded boat bottom up against the sky moved in next to ours and stopped. I jumped from the bottom, caught our ladder, and climbed out to see what was up. Turned out to be some fellow who was looking for somebody we didn't know. He unhooked and went whooshing off looking for a better source of information. But he had supplied us with a wrench for our cog wheels. As I was adjusting the straps on my face plate for the drop back to the bottom, my air intake suddenly began spouting salt water. Tom was watching, and after a moment of amazement at this peculiar happening he leaped for the air intake up on the bow. It wasn't there -- it was hanging in the sea. Our visitor in coming alongside had knocked it off the gunwale, and our compressor was dealing only with salt water.

There was nothing to do but pick up the gear from the bottom, head for shore, dismantle the compressor and clean the salt from the insides of it. We were lucky to have stopped it in time -- it wasn't designed for pumping water.

That took care of the day up to noon. Lunch on shore. The clouds gathered solidly, but returned even so. When I went down to the bottom rain was pocking the water. Rained the remainder of the afternoon. Tom and I looked for clams -- big ones -- to feed to our lobster. Though we shoveled until the water was filled with sand clouds so that we could not see, we found no clams. But we did find an octopus. He was under a rock with one eye showing, watching us. Probably laughing. He had clam shells all around his house. I brought over one of our hermits and let it walk past his den. The octo reached out and flung an arm around it, but the hermit lashed at him with one of its big claws and the arm snaked back into the den again. After that the octo made no attempt to intercept the crab, even after many walk-bys. Probably he was full of clams.

July 8. The usual west wing was blowing again this morning, and the usual jumble of dark clouds was on the horizon -- waiting to move in to give us trouble. We went out to the shooting area just the same, in the face of a dark squall that was reaching out for the sun. If the light went we could explore the area some more. Something new always was turning up. We might even find some clams.

Strangely enough the squall evaporated without ever reaching us; shortly after we went under water the sun came out and remained at full blast all morning. Understanding Bahamian weather is beyond me.

But before the sun came out we did some looking about. No clams, of course. However, in turning over a stone I came upon a very small red-and-white shrimp much like the Stenopus Hispidus, but without its long banded arms. I put it in a coffee can, and it will have to go into a pill bottle. It may be a new thing. It could, of course, be an immature Hispidus. And then there was an old moth-eaten conch shell moving about in the grass on the back of a big hermit. In the top of it among some sea growths was a well-used hole. In a moment or two a green head appeared in the hole, and two eyes on stalks. A green mantis was using the upper floor of the shell as a home. I offered it a bite of minnow. The shrimp grabbed at the minnow tail and tried to drag the whole thing inside its den, but I refused to let go. So he scissored off what he could. After a little of this I put down a small minnow bit as an offering. He appeared at once and vanished with it. Later when I offered him another piece he banged it away.

A mantis in a perambulating house is too good a bet to miss, so I took house and all to the shooting area and put it in the enclosure. A demoiselle immediately took notice and came to see what it was. The mantis would crouch and wait for her to come close, and then slap at her when she went by, she being twenty times larger than the shrimp.

Learned a new thing: lobsters eat starfish -- at least they eat some of them. I had put a smallish green-mottled star into the shooting enclosure, and this morning its arms had been reduced to nubs. From time to time the lobster would pick it up, and holding it on edge would chew on it. He

preferred minnow. But would return to the starfish whenever he had nothing else to work on.

After lunch a very black squall came in again from the west. We watched it for a few minutes and listened to the rolling of the thunder that was coming with it, and saw the lightening flickering inside of it, and finally came to the conclusion that this squall was not going to vanish away without a fuss. For awhile we considered spending our time on the bottom, come what may. But discretion won out and we pulled up the gear and ran for shore. A good thing. The squall turned out to be a doozy. At the house we had to close all the shutters and use buckets and towels to catch the water coming through the thatch. Stormed for an hour or more.

Chris came in before the squall struck. He had a nice clam of good size -- said he had stolen it from a murex.

July 9th. We learned another couple of things about lobsters this morning. The first was that the lobster eats vegetation -- at least some kinds. When I looked in the enclosure to see how the hermit crab and its stomatopod passenger were getting along I was surprised to find that there was no sprig of greenery on the shell anywhere. Something had given it a clean shave. And since the lobster was alone in the pen, I have nobody else to blame. And whether the lobster carried the mantis away or ate it along with the undergrowth, I can't say. But he was no longer in his apartment. Probably took to his heels when he saw the lawn mower coming. Too bad.

When we tried the lobster on the clam that Chris had collected from the murex he went after it with gusto. Smashed the shell to bits in a few seconds. The job was done so quickly that I had no time to switch

cameras for close-ups. Next we tried the lobster on a small queen conch. The lobster basketed it and began chomping on it, but after breaking off a few pieces of shell near the lip called it a day. I gave the shell back to him two or three times, but no sale. He had found something that he couldn't break into. The same was true with a turkey wing. Apparently his limit is clams. Wish I had a good big one. Some day we will learn where they keep themselves, and then we can try out several sizes.

Gave our little dromid (?) a workout today also. He uses half of an old clam shell as a cover. When he is not walking about with it on his back -- which he does very slowly -- he allows it to lie flat on the bottom looking like any of a thousand similar (and unoccupied) clam shells. He fits into it perfectly, and when frightened snugs down and melts together until he appears to be nothing but a glob of something pinkish almost filling the shell.

We turned him upside down to see how he would right himself. And he didn't. After half or three quarters of an hour of staring at him calmly lying inverted without quivering a muscle, we gave up on that aspect. After some fiddling around I managed to get him out of his shell by wedging a bit of scallop shell back of him when he lowered himself a fraction of an inch from his canopy. Out of his shell he was pinkish in color, with what appeared to be two fake eyespots near the front end. And he was confused. Many times he began walking blindly away from the shell lying upturned on the sand. But at last I got him to notice it. He clambered up and slid into it upside down, quick as a wink. And he didn't move again. But I had had enough of that kind of game, so I pried him out of his home again

and this time placed the shell with the opening on the sand. He raised one side of it and slid under. When I raised the shell to look, he was in the proper position inside. I repeated this little piece of action many times, and found him invariably very speedy about getting into his shell -- once he had found it. But my feeling is that he is definitely myopic.

On the way home there was a loud explosion in the boat. My big camera box had had exploded! I keep seven or eight pounds of pressure in the cases, and the heat of the sun had doubtless added several more. These housings are designed to resist pressure from outside, but not so much from the inside. One of the lug bolts had pulled its fastenings. When we got to the house and opened the case I found the lid blown off the camera and the batteries in a jumble. But as far as I could see, no damage that could not be repaired. It ruined about thirty feet of film. I have been doing undersea photography for about sixteen years, and never run out of new ways to get into trouble.

July 10. Mended the camera box, refocussed the camera, listened for strange sounds from it. So far as I could determine there were no bad effects of yesterday's blow-up. Thank goodness!

Since we are moving over to the study of stomatopods and need a different kind of equipment undersea, we spent the day building a small floating diffuser to shade the shooting area, and a stomatopod-proof mesh box where we can store specimens on the bottom if we need some spares. This took all day.

As night was falling we went out for our first look at the reeflet

by night. It is a strange feeling to drop off the end of the ladder without being able to see the bottom -- and the bottom seems a lot farther off. Our light threw a strong beam, but it ended a few feet away in a wooly blue haze, with inky darkness in every other direction. The person trying this for the first time is quite conscious of the darkness -- at least I was. Tom was at my shoulder and has his own light, but he wasn't to use it unless it was necessary -- not put too much strain on the battery up in the boat.

We found the reeflet after walking through the bright green grass. Things were quieter at night. Squirrel fishes appear to be worried by the light -- dorsals rest. There were no lobster feelers thrust out from beneath the big boulders. Probably all were out for the evening. About the first thing to catch my eye was a small octopus on a rock. When I looked his way first he was brown. A few moments later when I looked again he was green. The next time I thought of him he had vanished. A great many six-inch lobsters were wandering about close to the reef rocks, their eyes like golden sparks. And off in the distance were the big-eyes apparently all in a school. During the day they are close to the boulders, or back among them out of sight. Now they were drifting along three or four feet from the bottom, invisible except for their eyes shining like reflector buttons.

There were no parrots to be seen. It had been my hope to find one making a sleeping bag. But no. Perhaps I didn't look in the right places. But Tom saw none either. We moved out again through the grass, shining our light up to the surface from time to time to the white boat

bottom with the ladder hanging from it. In the grass were many points of light. Some of them were eye-reflections, and some, I think, carried their own lamps. Many of the animals owning the lights turned out to be red shrimps. Under the glare of the lights I had merely to bend down and pick up those fellows. They came alive fast enough when I had them in my hand, but up to that time they were hypnotized.

After half an hour or so we climbed back up into the boat into the tangle of hoses and electric wires. This is a new thing, almost as though we never had dived before. It will take a few dives before we can observe accurately and be completely at ease. Next time we will try a different location. We drove back over the quiet sea, with the sky full of stars and a sliver of moon on the horizon; and down below the dark ocean, with here and there a spark on the bottom. I thought of all the eyes we would see if we were down there shining our lights.

July 11th. Out for stomatopods early this morning. Have a small five-sided enclosure, the diffuser, and the screen box with three or four stomatopods in it. The enclosure is to be set down over the home of a possible subject, and then situations can be created that will show us what kind of fellow a stomatopod really is.

We found a green stomatopod about three inches long living in a small coral rock on the rubbly bottom, put the glass-sided enclosure over him, and then settled down to watch. I offered him a minnow, and he leapt for it, allowing me to carry him about above the bottom while he tugged and slashed at it with his front feet. I wouldn't let him

run off with it because I was afraid we wouldn't see him again. He showed no fear, and no concern about being in an enclosure. We put in a live small minnow, but he paid no attention to it -- probably because it remained near the top of the cage, well out of his reach. Later we introduced another stomatopod, somewhat smaller. He was very much aware of that, and when the newcomer ventured into his rock he beat it up and sent it flying.

I had taken only a few feet of film before I was conscious of the fact that the camera was making a peculiar sound. Concluded that it had lost a loop. Nothing to do but go ashore and check on it. Diagnosis correct. This is the camera that blew a gasket yesterday. Hope this doesn't indicate a more serious trouble.

Returned to the location and made some more studies of the stomatopod darting about like a weasel. Shot close-ups of tube worms with still camera.

July 13th. Monday. This morning when I opened the lid of Old Long Snout (the camera with the extended 100-mm lenses for close-ups -- which got itself exploded), I was met by a cascade of buckled and pleated film; the camera was jammed solidly with it. Apparently it had lost a loop the second time and the take-up also had failed. What a business!

Oddly enough when I ran a piece of film through it for testing purposes everything moved without a hitch. The camera action sounded a little rough, but we ran a reel through it three or four times. Not once did it lose the loop. We concluded that the trouble on the last roll must have been a coincidence.

On Saturday, too late for us to do anything about it, came a phone call from the airport that we had a package. Our long-delayed order of fast film! It was to have been sent in time for us to pick it up when we came through Miami in June. But it wasn't there. Early in July a dribble of two thousand feet of Ektachrome Commercial had arrived by way of the American Consulate where it had been hung up for several days. Had I not brought along film as a safeguard and for the period in August after the expiration of grant funds when I shall be shooting on my own, we would have been without film. This batch of film coming in was to be medium speed Ektachrome, a material with speed enough to allow photographic work undersea in cloudy weather, and possibly some at night. It is not fast enough to be too grainy, and has good printing qualities. Under normal circumstances I would have run tests on it early in the season and we would have had the bugs out of it before we ran out of our slower film. Now we have four rolls of Smithsonian film remaining, and the prospect of an untried film to deal with.

On Sunday I had checked at the airport, but the air freight office was not open, naturally, and would not be until nine Monday. I was there at nine, and was greeted by the information that the office did not open until nine forty-five. After hanging about until the appointed hour, another surprise. The package wasn't film at all, but a big box of field equipment for John McCain who was arriving as field representative of the Smithsonian. And I could not have the box until the papers were stamped by the American Consulate.

Back at the house again I found that a call had come from the Consulate

that the film really was in -- they had it! Down at the Consulate it turned out that they didn't really have the film -- they almost had it. It was at the postal station at Oakes Field. The woman at the Consulate gave me the papers, and signed and stamped the ones for John McCain's box. Off to Oakes Field. The package of film at last! Right in my hands. Out to the airport at Windsor Field for McCain's box. I approached the proper official, signed papers in hand. He looked at them. Where was the invoice? I had no invoice. Sorry, no invoice, no box. So that was that.

Breathing heavily I returned to the house. At least I had the film. Then I opened the film box. The film was there, but the numbers on it were strange to me. This was not the film we had ordered; this was something else. We checked out the numbers against our film specifications. This was high-speed film, not medium-speed, with a rating ten times faster than the film we had been using. Oh, me! Somewhere there had been a bungle. Too late to send the film back and get more. Nothing to do but test it, hope for an early report, and to hope also that the film would not be too grainy, too about exposure, with enough latitude to look into the shadows and yet not burn up the highlights.

Since I had done nothing all day but run wildly about the island trying to pick up packages, we determined to go underwater at night. We could test the new film with the floods, and could give John McCain a look at the night seascape. He had arrived after a three-day bus trip from Washington, ripe for a new adventure (he was ripe also for some sleep, but he was willing to forego that).

We loaded some film into old Long Snoot, put knots in a heavy line to use as footage indicators so that we could check light distances. We hoped the film wouldn't jam again in the camera.

It was a quiet, star-filled night. We went to the area on the south side of the bay where the stomatopods usually hang out, and where there are many holes that are empty during the day. We hoped to see stomatopods running all about, and strange animals from these holes. Naturally we were mistaken. The flat, rubbly bottom was almost empty, save for the gleaming eyes of the nocturnal shrimps, here and there a worried squirrel fish with his doreal erect, uneasy and confused by the light. Of stomatopods we saw only one, and no strange animals at all. We did see one flying guarnard, quite large, with a tattered wing. He was on the bottom, and very sleepy. I could put my hand under him and lift him from the bottom, and he was only uneasy about it. He would sense that something was going on that was not usual, flare his pectorals and wing off a few feet and settle back in the rubble. We saw it several times during our rambles, and each time it allowed us to come within touching distance without alarm.

One strange thing we did see -- a small fish that looked exactly like a fierasfer (pearl fish) moving quietly an inch above the bottom. It was perhaps five inches long. I had no net that would hold it, and while I watched it became concerned and quietly slipped tail-first into the sand and vanished. Tom and I both probed the bottom for it but found no trace. If it was a fierasfer, it is possible that this is its method of evading predators when it is away from the shelter of its cucumber host. We must look into this business further.

The movie-taking was a bust. In order to use the close-up camera the tripod is essential. We found that if we take time enough to set up a tripod and make calculations as to light-placement the population of small swimming creatures in front of the lights is so great that any sort of data based on light-distances would be useless. We must use a camera that can be operated without loss of time.

July 14th. Tuesday. This morning we spent some time calibrating old Long Snoot for a range of F stops that would accommodate the new film for testing. Ran the used film through it several times to see that it still was working. Then I put in a roll of the new fast film. Before I had run through the leader it jammed solid. I pulled the loop free and tried again. Same thing. This was no coincidence; this was a damaged camera, one that had to be sent in for repairs.

Bowing to the inevitable I removed the long lenses and the controls, found a suitable box, carted the camera to the airport and started it on its way to California -- with a letter imploring a speedy return.

July 15th. Wednesday. Well, we still have an undersea camera to use, and tests must be run on the new film. Tom and I took the wide-angle box out to the location where we had done the hermits and the lobsters and ran a series of tests with apertures from F:4 to F:16. That should bracket the proper exposure somewhere along the line. We rushed in, bundled up the film, and shot it in to Kansas City, with a letter begging for a quick analysis and report. Now we shall have to wait.

In the afternoon Tom and I to the filming area again to do some stills -- it was too cloudy for anything else. All about the little

reeflet on the grass were lobster heads. From the time we had been there and returned again someone had visited our reeflet with a spear -- each lobster head had a neat hole in it -- and there were but two live ones left (I counted the remains of seven); one small one hidden among the rocks, and the one still in our shooting enclosure. It is definitely against the law to take lobsters at this time of year. It is doubly sad to have someone take them when they are practically our friends. I had been giving them minnows every time I came to the area.

July 16th. Thursday. And today it rained. All day, from a vast leaden sky. Not the squally sort of thing one expects here, but a steady downpour. No rumbling of thunder; just a business-like settling-down to rain. And although the wind (from the east) appeared no stronger than usual, the sea was running high, and the breakers were white and ragged along the faraway edges of Goulding Cay.

By afternoon when a short break came in the weather we concluded that we could just as well be doing some stills with flash fill-in, and clambered into the soggy boat to run out to the stomatopod area; but when we arrived Tom turned on one of the big lights and lowered it over the side. Nothing but a blue-green haze. No pictures in a place like that.

As Tom swung the light over the water I caught sight of a three-foot fish lying just beneath the surface on the lee side. John was at the bow with the anchor in his hands, and had been on the point of lowering it until he saw the condition of the water. I thought for a moment that the fish was a middling-size barracuda, and then realized that it was a very large houndfish. We were drifting down on it. I yelled. "It's

a houndfish; look out, he's going to jump!" (stupidly not telling Tom to turn off the light). John swung away from the bow, crouching with the anchor still in his hands. The fish crashed out of the water like a rocket, sailed over the bow and into the ocean on the other side. It had missed John by possibly six inches, going like a flung spear. After this we will be more careful with our lights. Houndfishes (and needlefish too) almost invariably leap in a frenzy of released energy when they are in the glare of a strong light. John came pretty close to getting a Purple Heart on that one.

We swung across the bay -- with lights out -- to our main shooting area, and finding that also cloudy, moved down towards the base of the bay where the water was more calm, and there were coral heads near shore. The water here was cloudy, but not impossible, so we dropped anchor, and Tom and I went down. The coral heads loomed up in the dark like small mountains, with the gorgonians, the tall finger sponges, the turtle grass on the bottom, all swaying profoundly, first one way and then the other with the passing waves, and only the coral rooted fast.

Here and there about the sides of the big star coral boulders were squirrel fish, always with their dorsals erect, uneasy in the light. The grunts and the goatfish were browsing like cattle out in the swaying turtle grass, with their tails up most of the time. I had expected to see the eye-sparks of shrimps all about as usual, but during the half-hour or so we were on the bottom I saw only one. Perhaps the wave-action had something to do with it; possibly they prefer to do their prowling in calm water. But there were boxer shrimps on the coral, their red-and-white

stripes showing strongly against the dull stone. I thought I saw one doing a cleaning job on a coney, but Tom insisted that the coney just happened to be there. And I was so busy trying to brace myself in the current to get a picture that I couldn't observe properly. And before I could press the camera trigger the coney had vanished.

We looked about for sleeping fish (I am especially anxious to find a parrot in its mucous cocoon) and came across a black angel. It was resting propped against the base of a big coral boulder in a fairly sheltered hollow. I moved the light close to it but it failed to pay any attention. The light was within six inches. I reached out and put my hand on the fish. It moved very sluggishly out of the way. When I took a firm hold of it the fish shook itself free and sailed off to the shelter of another stone, apparently only half awake.

A spiny puffer swam into the light circle, looking more near-sighted and fuddled than usual. When we held the light on it the little fish waddled straight up towards the surface, and after attaining a height of about six feet, peeled off and headed straight for the bottom again, with a smug expression that appeared to be saying, "I may look drunk, but I haven't touched a drop," and swimming strongly piled head-first into a rock.

We did see some parrot fish back among the coral heads, but none with cocoons. The parrots stared wildly at us, as though they were held in the grip of some sort of nightmare, frightened out of their wits but unable to stir. If we touched them the spell was broken, and they would leap to life and dash off, banging into anything in their paths. If we followed after,

we would find them somewhere else, usually, lying as quietly and looking as wild-eyed as before.

July 17. Friday. The water was better today, but by no means clear. Tom and I went to the stomatopod area, mainly to do some stills. With old Long Snoot in for repairs there is little we can do in the way of motion pictures of small animals. Most of these shrimps are under three inches in length, and not too well suited to the wide-angle camera. It was on the stomatopods that I had hoped (and still do) to use the long lenses to the best advantage.

The stomatopods rarely live in the bottom out in the open, but prefer the small lumps of decaying coral lying about in some areas, in from three to eight feet of water. These pieces of rock are as full of holes as a cheese, and the shrimps take full advantage of them. They remind me of weasels. When a stomatopod sees something it would like to have, its head will appear at four or five of these holes in rapid succession, while the animal tries to decide which hole gives it the best advantage. It scoots across any open area like a flash of light, but once it has made up its mind that something is worth tackling it is very bold. I saw one once jerking on the leg of a crab that was backed against a rock trying to ward off a trigger-fish. Although the crab was ten times larger than the shrimp and could slice him in two without half trying, the shrimp meant to take full advantage of a situation that might just possibly pay off. The mantis shrimp carries its forelegs much as a praying mantis does, and may strike with them or use them as hands. In this instance, after jerking

on the crab leg at opportune moments for several minutes the little animal gave up. The leg was fastened on more tightly than it had imagined, probably. I saw one once dash up a small purple sea fan, grasp a swollen egg shell with its forearms, and whisk off out of sight with it, like a monkey with a cocoanut.

Tom and I would tie a small minnow (dead) on a bit of string and dangle it near likely-looking stomatopod hangouts. If there were one in residence we would know about it almost at once. Usually the mantis would dash out, grab the minnow and try to carry it back out of sight. The string put a stop to that sort of business, however. But the shrimp would usually manage to jerk off a piece of it before dashing for cover. For taking pictures we usually held the minnow down with a bit of stone, trying all the while to keep the mantis away from it until the camera was ready. This often took some doing, because the mantis is very fast and any finger that got in its way received a good whack from its forelegs.

There are large species of stomatopods that live in deeper water in burrows on the bottom, but they are much more shy than the shore fellows. In 1961 we found one near our shooting area beside a reeflet. Never succeeded in seeing more than the front half of it when it flashed out to pick up a minnow. Most of the fellows that Tom and I were working with along the shore are green -- some leaf green, and some darker. They appear to come in many colors, however, and many patterns.

July 18. Saturday. Events -- especially undersea -- rarely turn out the way one plans. The day was well mapped. We would run out to the old shooting area, photograph the lobster beginning to eat a starfish --

we have him with one that it chewed down to a set of shortened spokes; -- then we would try him on a brittle star, and finally feed him a very large clam to see if he could handle it, (one of the boys had found a big clam under a rock). During this time we would be shooting appropriate stills. After we had finished with the lobster we would turn to the big hermit and try to pick up some better pictures of his efforts to get himself into a new shell. We would do some stills of that, also. A neat, tidy program.

The first thing I noticed when we arrived at the shooting location was that the front screen on the shooting enclosure was lying flat out on the ground. It had not been secured well enough against the heavy surges of the past few days, evidently. The lobster was nowhere in sight, of course. And the hermits were missing also. That took care of the well-planned day of shooting.

First-off, to find our friendly lobster. Three sets of lobster feelers were sticking out from the shelter of the big boulder; one more than had been left by the fisherman who had raided the reef a few days ago. Perhaps our lobster owned one set of these feelers, and the day would not be lost. I took some minnow and tested these fellows. They all were strangers -- and they wanted to be left alone. They straight-armed me with their feelers whenever I came close, and they were not the least interested in my minnow.

However, Tom got a long piece of wire coathanger that we used for various chores, went around to the far side of the boulder and tickled the backsides of the lobsters with it. One of them couldn't take it, and came prancing out. I picked him up in a net and dumped him in the shooting enclosure. He backed into the coral setting and sat there looking glum.

Next to find a hermit. We circled, as far as our hoses would permit, taking a look at every old conch shell half hidden in the grass. On one of these passes I noticed Tom engrossed in studying something on the bottom, and went over to see what it was. A three-foot snake eel was on a hunting expedition, gliding quietly through the grass, poking its head under any fallen object, trying to sniff out something edible. Sometimes it would lunge into the grass roots, head half out of sight. It was a beautiful specimen with a ground color of dark tan covered with deep brown half-inch polka dots, each with a bright gold center. Its continuous dorsal fin was edged in light blue.

I rushed to the cameras and brought them, to record this hunting expedition. The eel was completely oblivious to us, and went quietly about his business as though he were completely alone. But the trouble with him was that he had a single track mind. He had laid out a route, apparently, that went straight north, and north he planned to go. We have slightly less than a hundred feet of hose, and it would take no time at all to get to the end of it. I would set a camera down in the eel's path. He would bump into it, slide along it until he came to the edge of it, and turn north again. I tried sliding it along with him as he went. This only caused him to swim faster to get around it. If I was too obvious about it he became frightened.

After much laboring I had changed his direction possibly five degrees, our hoses were stretched to the limit, with Tom braced to hold the boat against the wind. And then the engine died. The compressor always stops at a time like this. Tom went lumbering off, following his hose to the invisible boat, and I turned on the reserve tank, opening the valve for a

breath when I had to have it, fighting the stretched hose, blowing my tank free of the water that kept leaking in from the reduced pressure, moving the camera box in front of the eel, trying to check its northward journey.

The air was beginning to come weakly from the reserve, and I had decided to take only two more breaths before giving up the whole project and heading for the boat myself, when I felt the trembling of hose from the engine pumping air into it. A couple of minutes later the pressure on the hose began to ease as Tom moved the anchor to bring the boat in my direction. And the eel continued heading north. But we didn' care; we could picture him anyhow, with plenty of hose to spare. When we had used all the film we felt was necessary we watched him moving methodically through the grass, hunting and heading northward out of sight. By now he is probably up near Greenland somewhere.

Tom turned up with a big hermit in a conch shell. He was a stubborn fellow, simply refusing to leave his shell. Usually a small hole in the back of the shell where one can insert a wire for a tickler is all that is necessary to make a hermit abandon his home -- he can't stand anything tickling his rear. But this hermit simply didn't care, and it was necessary to remove the entire back of the shell before he could be induced to abandon it. He sulked in the rocks for awhile, trying to hide his nakedness under a piece of coral, but finally we persuaded him to try on a new shell.

Ned Cooper and John showed up with three puffers which we put into the shooting enclosure. We hoped to photograph them ganging up on a crab.

Naturally, this didn't come to pass. The crab scampered about the bottom to his heart's content and the puffers paid no attention. One of them -- the largest -- spent its time nipping the other two. And they spent their time trying to get away.

July 20. Monday. The puffers behaved today the same as they did on Saturday, paying no attention to the crab in the pen. Apparently they are all living together as a happy family. This is not the way it is supposed to go. Puffers are supposed to gang up on crabs and eat them -- according to the authorities. These puffers do not know their business.

The lobster had come to the point of being slightly interested in minnow, but not enough to cause him to leave the corner of the pen that he had selected as a homesite.

While I was trying to photograph a Yucatanicus cleaning a big-eye, Tom showed up with the long-handled net and said he was going to get a new lobster. Together we found one under some nearby rocks, tickled it out into the open, and scooped it up. We put it in the enclosure with the other one, hoping that one or the other of them eventually would come to be civilized.

In the evening we tried another stint of night-shooting, selecting the same reeflet as our location. The first thing I saw upon touching bottom was a rock lobster moving through the grass. During the day these fellows are invariably back beneath the rocks, and appear to be much more reticent than the spiny lobsters. Not far from the rock lobster I noticed two small prongs sticking out of the grass. Turned out to be a small octopus with its eyes up, watching the light. It was not afraid,

and came moving along through the grass. It was pale blue in color, not much bigger than my hand, and it appeared to have large brown eyes. As I watched it turned green, and then brown. After taking some pictures of it I asked Tom to see if he could pick it up. The little octo didn't care too much for this. Finally John, who was hovering nearby on his fins, came in with a net and took the little fellow up to the boat.

Later we saw another similar octopus on the coral boulders, more wary than the first one. When I returned to the boat Chris, who had been reeling in and letting out the light cords, said he couldn't keep the octopus in the bucket (we had nothing with a lid) and that it was down in the bottom of the boat -- he thought. I thought differently. My thought was that the second octopus probably was the same one. It had crawled up the side of the boat and leaped back into the water, wondering what in the dickens we were up to, and coming to the natural conclusion that we weren't to be trusted.

July 21. Tuesday. Still there has been no report on the test film we sent in to the processor last week. And the camera hasn't been returned. The only word I have had so far on the camera has come in a cable -- to the effect that if I did not possess a customs document on the camera I would have to pay forty dollars duty before the repair people could get it. I dispatched a letter at once with the information that the camera had been purchased in the U. S. sixteen years ago, had been through customs many times, etc. All things conspire to slow one down sometimes.

John, Chris, and Ned spent the day looking for dromids and other things near the settlement of Adelaide. Came back with five dromids (the one I photographed previously was not a dromid, but a hypoconchas), a great variety of star fishes, and several stomatopods. A good day. Tomorrow we will get busy with the little dromids, and do the best we can until the close-up camera comes back.

Tom and I dropped under water in the evening in the stomatopod area and stomped about on the bottom for an hour or so looking for something to photograph. Again there were no stomatopods. Apparently they do not prowl at night as I had thought they did -- at least not on a moonlight night. Working with two cameras, flash bulbs, heavy iron tripod, hose lines, light cords that hang up on the rocks -- I can think of simpler ways to take pictures.

July 22, Wednesday. Dromids are wonderful. Those that the boys brought us yesterday have sponge caps an inch-and-a-half across, and sit stolidly under them, holding them on, of course, with one pair of feet. Their bodies are orange in color, and the sponges slate blue.

We detached one of the little crabs from his bonnet, and set him down near it. Although we were in a sheltered area (the shooting enclosure) the sponge rolled with the waves. The little crab would appear to hunch himself, and at the right time leap at the sponge. Sometimes it got away from him entirely, and sometimes he would cling to it while it rolled over and over, not giving up until he had managed somehow to secure his feet in the proper position and once again become a small walking sponge.

After all his effort it did not seem right to pry him loose again to try the stunt all over again, but pictures must be made, and pictures always require several "takes." And then, of course, we must put two of the crabs on the bottom with only one bonnet. Each time they both battled manfully for the sponge, but the moment one got himself solidly under it, he would trundle off, leaving the other naked and alone. At the end we gave them back their sponges and put them in a small enclosure where they will have to wait for the return of the other camera and the close-ups. They appeared to take this business in good spirit.

July 23. Thursday. Some friends phoned saying they had found a huge crab in their fish net, and would we like to have it to look over. There had been two of them, actually, but one had died. They didn't know what it was, except that it was a monster. I suspected that it was a big stone crab, and dispatched the boys for it at once.

When they returned they had the crab in a bucket. It was big, so big that it would fit in the two-gallon pail only on its side. Its carapace had a width of about seven inches and its arms were exceedingly long ending in claws, cream colored, (the basic color of the crab was mahogany) and fully three inches long. The carapace was slightly pointed toward the front. We can take measurements later on. The crab was resting quietly in the bucket, but since the one caught in the bucket at the same time died, I took no chances, but had it moved to one of the pens where we do our shooting.

Had an interesting experience with grunts today. We had the front glass off the shooting enclosure photographing the two lobsters having a

bit of friction, and two small golden grunts about four inches long began having some sort of sparring match. They went at one another at a great rate, whirling and flipping, and sometimes clamping jaws and doing spirals that took them several feet up, or spirally, down into the sand. On one of these set-tos, they went sailing out of the enclosure altogether and continued their battle in a school of grunts hanging several yards away.

I assumed I had photographed all that sort of business I would get. However, in a couple of minutes they came steaming back, shot past Tom and me, straight to the center of the enclosure, and took up their engagement where they had left off. A couple of movie-struck grunts showing off!

July 24, Friday. The big crab is doing well in his new surroundings -- as far as I can tell, anyhow. He is not very demonstrative. His movements are slow and ponderous, like a mechanical monster. He walked about with slow steps over the coral, and clambered up over the tops of the finger sponges in the center of the enclosure. In passing he broke off a piece of one of the black sponges and put it in his mouth with his great yellow claw.

When the crab came to rest finally in a spot that suited him I offered him another piece of sponge, thinking that possibly that was his food. Not interested. The lower ends of his legs are hairy, somewhat similar to those of a lobster, making me feel that possibly this fellow uses them for exploring for food in the bottom. I offered him a clam, however, and was turned down. He waved it away majestically with one claw.

Thinking that possibly we could come up with some food that the crab would enjoy, Tom and I spent some time going through the rubble of old

coral heads nearby. Brittle stars interested neither the crab nor the lobsters. I had found two flexible gray cucumbers, and offered him one of those. It somehow got tangled in his legs and became frightened, and began to release the long, translucent sticky strands that it discharges to try to discourage predators. Some of these became fastened to his claws and worried him a good deal -- in fact one claw appeared to be clamped shut with the threads. The crab spent an hour, probably, painstakingly directing one claw towards the other one in an effort to remove them -- like a crane operator trying to direct his shovel to pick up a piece of clothesline.

Today, after having begun to haunt the airlines in the hope that my broken camera had been returned, I received a letter from California. The camera was still in customs. My letter to them in answer to their cable had never arrived, apparently. So I sent another letter. Sometimes Bahamian mail is very quick. Sometimes letters vanish altogether.

This evening we went back for some night things. Worked around a coral formation near our shooting area. Many parrots lying under and alongside of coral boulders. They lie absolutely motionless until they are held in one's hand. Then they come awake into violent action, flying off and banging into anything and everything that stands in the way. I had sent the cameras back to the boat before I saw a cowfish near the bottom. It made no move when I picked it up. In fact, its fins relaxed altogether. I could hold it firmly or lightly, as I chose, and it rested without moving. The color changed from a dull mottling to the most vivid aqua on a silver ground. After tilting it this way and that with no sign of its being

disturbed, I opened my hand and it swam placidly away. It was not a small fish as cowfish go -- ten or twelve inches long.

After having spent these evenings looking at the great numbers of fish that appear to be deep in sleep along the exposed edges of the reef I simply cannot understand how they escape being eaten by the prowling predators. Sharks, for instance, do a great deal of cruising at night, and morays appear to be fully awake. This situation does not make sense.

July 25. Saturday. This morning when we arrived at the shooting area we found a visitor. An octopus was in the cage next to the shooting enclosure, wrapped around a conch. The cage has no bottom, and he had pushed his way in.

Although we had nothing in particular in mind for an octopus we opened the doors to the shooting enclosure, and with a slight suggestion on our part he sailed in and came to rest on a rock, very shortly disappearing into a hole. I placed his conch next to the hole to let the octopus know that we bore him no ill will. The two lobsters did not feel that way about him, however, and went stalking out of range. He is not large enough to eat them. I should think, having an armspread of two feet or so. But it is obvious that the lobsters would prefer him to be somewhere else.

The big crab appeared to be paying no attention to the octopus at all. The crab is much better equipped to defend itself than the lobsters, probably, and its conduct follows accordingly. However, some time later when Tom and I were feeding some minnows to the lobsters I noticed Mr. Big heading for the octopus, which was finishing the conch. And much to our surprise a considerable battle ensued, with the crab apparently the aggressor. Whether he considered the octopus potential food or just felt belligerent, I don't know. So far as I could tell the crab simply

swung at the octo with a big claw. The octopus would stand on edge with its mantle stretched, and its arms curled back out of the way. When the crab came in close the octopus would flail out and grapple with a claw. After appearing to try to bite into the claw the octo would let go again and back off into the rocks. This action went on for some time, and on many occasions the octopus appeared to be pushing the battle.

After about five minutes each party backed off, neither one appearing to be the worse for the set-to. I have no idea what started the fracas nor what the eventual conclusion would be. The sea had been making up all morning, and by the time we had finished watching and filming this combat the whole enclosure was rocking from side to side with each wave overhead, kicking up clouds of dust that obscured the area. We tried weighting the cage with big cement blocks on the corners, but to no avail. There was nothing to do but suspend operations. Tom put the crab in an enclosure some distance from the shooting pen, and we went up to have lunch, hoping that there might be some indication of a lessening of the wind.

After our meal Tom went down to see how things were, and found one of the big plate glass windows off, banging on a coral head. He could not replace it, so we put on our diving gear again and went below. The octopus was still in the enclosure and had just captured a big blue crab -- I could see one of its legs sticking out from beneath its mantle. This octopus had recently finished eating a conch that must have had a half-pound of meat in its body. Now the crab. I wonder how much an octopus can eat. I hope this supply of fresh food causes the octo to feel content with its new home. If it isn't content it won't be there

on Monday. We took the glasses off the enclosure, replaced them with screens, tied up a hole in the net top that might have been an escape route for the octopus, and departed. The wind blew steady and strong all day.

July 27. Monday. A good day. Sun, and not as much wind as on Saturday, thank goodness! And much to our relief our octopus was still in the shooting pen. Hungry, too. When I put my finger up to the screen he took hold of it and tried to pull it in. But I go only about so far with that sort of thing. He seemed very disappointed when I pulled the finger away. I think actually that he would do better with the crab, or something of that sort.

The big crab was still in the holding pen, with his feet stuck through the mesh. He has long, sharp, black toenails, and he really can hang on. The crab is not too handy with his pincers, so Tom takes him by the carapace and pulls while I try to poke his nails back through the screen. He has so many legs and they are so spread out that it takes a lot of fast work to get him unhooked. It took a long while, but finally we managed and put him back with the octopus. Octopus not interested. Really appeared to be frightened of the big crab. Flashed white, on and off, in a fraction of a second. Never have seen an octopus flash like that before. There were a couple of mild set-tos with the crab, but nothing of any great consequence.

John brought out a flamia with its flat pincers folded across its chest, and we added it to our collection in the shooting enclosure. Had to switch the octopus, however. When we found him going out of control

we gave him a blue crab as a substitute. He seemed pleased.

Tom and I dropped down for some more night shooting. Pitch-black night, with no moon. Couldn't find the reef we wanted and had to settle for another. Turned out to be the one we had worked around back in 1957. Great many fish. The three-spotted goatfish lying in the grass were scarlet, with no sign of their usual brown spots. Could change to pale lavender in half a second. The mud parrots, usually gray and uninteresting, also were shades of rose and red. One of them was lying on its side on a patch of stones. Saw two huge trunkfish. Tom held one of them in his hands, but it got excited after a moment and after trying to go forward, threw itself into reverse and got away.

July 28. Tuesday. Had planned to do some more work with lobsters, but our pair had disappeared. When we came to the shooting enclosure on Monday, they weren't in it. Perhaps when the glass had come off in the swells of Saturday they had slipped out. Either that or someone had plucked them out on Sunday. We spent several hours trying to catch some more to take their places. And always they managed to get away. Except one. And it was so excited when we unloosed it in the shooting pen that it went bucketing about backward like a chicken with its head off, straight out through the open door. Tom grabbed at it as it went by, and caught it by one feeler. He stopped it for about three tail-kicks and was left holding the feeler. And we were once more without a lobster.

July 29. Wednesday. Decided to ignore crabs, lobsters, and octopus, and in spite of no close-up camera to begin work on the stomatopods. Dr. Chace had reported one of the jawfishes we sent in to the Smithsonian in

'61 had been eating stomatopods. So we took our small enclosure -- which has no bottom in it -- found a nice big jaw-fish (opistognathus maxilosus) and set it down over him. He backed down into his burrow, and his forehead turned white -- he was worried about this sort of business. But I gave him a few minnow scraps and from then on we were pals. He remained with his head out of the hole unless we were actually about to touch him.

Ned and Chris had a good supply of stomatopods for us in a wire cage. We placed a can over the jawfish so that he couldn't see what was going on, moved a weathered piece of coral to within a few inches of his doorstep, and installed a two-inch stomatopod. After a period we removed the can. Expected to see the jawfish snatch at the stomatopod as soon as it moved. Not so. If it came out into the open he would make faces at it. So we put in two or three more. Two were green. The green ones were able to chase the drab ones out of any hiding place they took a fancy to. Very aggressive.

Later on we tried putting a piece of minnow under a stone half-way between the stomatopod rock and the jawfish. A green one had the rock, and each time it would come out for a dash at the minnow the jawfish would make a face at it and it would duck back. Aggressive with the stomatopods, but very shy with the jawfish, this green fellow. After a bit one of the gray stomatopods came sneaking over, paying scant attention to the jawfish. The jawfish lunged at it, but overshot, and the stomatopod went into the jawfish burrow.

The jawfish had not seen where the stomatopod went, but when he backed down into his hole he realized that something was wrong -- his tail

was bumping into something that shouldn't be there. He leaped as though he had been jabbed -- and maybe he was -- and the stomatopod flipped out of the hole and under the rock. And again the jawfish didn't see him go. The fish pulled his face into a big leer, and peered down into the hole, cocking his head on one side so that he could see better. Couldn't see anything. Tried it several times, from several angles -- "who's down in my basement?" Nothing came out. After a bit, looking completely mystified, and with a silly grin on his face he gingerly settled back into his hole.

July 30. Thursday. More work with the stomatopods and the jawfish. The stomatopods became very bold today, and since we had a number of them in the enclosure the jawfish had a considerable amount of trouble keeping them all in line. As a matter of fact, he didn't. He was overwhelmed. While he was busy watching one shrimp, the big dark green one came up from behind and slid into his burrow -- and didn't come out again. For awhile the jawfish looked puzzled and uncomfortable, afflicted with the jitters. Then he came all the way out, turned around and peered down the hole he had just vacated -- to be face-to-face with the green stomatopod with his forelegs cocked ready for a battle. Apparently this was something the fish hadn't counted on, and he swam off a few inches to think it over, coming back from time to time to make sure his eyes weren't playing him tricks. And always the stomatopod was waiting for him, alert and hair-triggered.

Poor fellow! Apparently the jawfish was all bluff -- or he had eaten so many of our minnow scraps that he had lost his ambition. In any event, he decided not to battle, but sorrowfully left his home and

settled down in a small patch of weed at the back of his enclosure.

Tom and I were completely mystified at this outcome. The jawfish is supposed to eat stomatopods. And this was a large jawfish. Although these are fairly large stomatopods -- two to three inches -- the fish should at least have given battle. Strange doings. We determined to let matters rest as they were and not come to any conclusions until a night had passed.

The medium-speed film has come at last! John picked it up while he was in town today, and the package was on the dining table when Tom and I came in from our day's shooting. Well, we now have one day until the official ending of this session. And here are a dozen rolls of film that were to have been waiting for us in Miami the last of May. No possibility of shooting them until we have made tests. I shall have to try them out and shoot them during August while I am working on my own material. The wages of red tape.

The broken camera has not been returned. But there is word of it. I phoned Los Angeles and learned that it had been repaired and sent off in this direction a day or two ago, air express. Now will come the battle of trying to find it on the island, and after finding it to try to get my hands on it.

July 31. With some of the new film in the camera we ran over to the jawfish stomatopod wrestling pits to learn how things stood and to make some tests. And much to our surprise, there was the jawfish back in his home, fit as a button and sassy as a gander. Only one stomatopod in sight, a medium-sized green one that had made a home beneath a stone six inches from the jawfish's

burrow. Each time it stuck its head out into the open the fish would leer at it, and it would duck back out of sight. The fortunes of war most certainly had changed. The jawfish now had everything under control. But how he had brought it off, no one will ever know. He looked smug -- it must have been something pretty fancy. When Tom put his finger down by the fish's nose he took it in his mouth and gave it a little shake. Ready for anything.

With the light coming and going from the passing clouds we ran off the tests, while the jawfish kept the stomatopods scuttling out of his reach. I wrote the data on a little board that constantly was getting away to float to the surface, using a pencil that did likewise. It is difficult not to lay a pencil down when one is through with it. However, underwater that is not the correct procedure.

August 1. Saturday. No word yet from the camera -- save written notice that it is on its way, and has been for several days. Sunday the air express office is not to be open, and of course Monday is Bank Holiday. So it will be closed then, too. The man I talked with said that if a package were to arrive containing something perishable, I could get it. Not otherwise. Sometimes I feel that cameras are perishable, but it is likely would be difficult to get the express people to agree with me. I am certain that the camera has been here on the island for three or four days -- hidden away in a mouldy dungeon where all things are placed for a few days to keep people frustrated.

We now have two sequences that must be re-done for close-ups -- the stomatopods and the dromids. I hope we can do it. But with no reason for doing more long shots we decided to move on to try for some film on

the burrowing shrimp. The ones we have found are very timid, live in burrows like jawfishes (neatly chinked up with stones and shells), the main difference being that the houses of the burrowers go in at a slant, while a jawfish house goes straight down. (He wants to be able to hang on to his pectorals in the opening, ready to swivel in any direction.) Also the burrowers do not pile shells and stones around the openings of their homes. If they want to make any changes they haul the excavated material inside. Must have some big storage room somewhere. As a matter of fact, I am of the opinion that they must have a number of tunnels, and a number of doorways, keeping some of them blocked with shells. The animals are very timid, deep brown in color, with slender, spidery legs and apparently two sets of pincers, one moderately large pair, and one quite small. I have seen only one or two of them completely out in the open, and they appear to be about three inches long. If there is anything they want outside of the burrow mouth, they usually dig a ramp towards it, so that they will at least be in a slit trench when they reach it. But we have not been able to lure one more than two or three inches from the mouth of its den. And it can flash back out of sight as quick as light. None of us so far has been able to capture one. John tried poison -- to no avail -- and Chris and Ned have injected strong salt solution into their burrows with flexible tubing. Nothing happened. Tom and I will try friendship. We will try to melt one into coming out and revealing himself just because he feels like it.

Chris and Ned marked a burrower's house, so we moved our small enclosure to it, set it in place, chinked up all the cracks -- mainly to keep small, prowling slippery dicks from getting in and running off

with our minnow baits. Tom placed a minnow under a piece of stone near the burrow opening, and we waited. Very shortly the shrimp's antennae were flipping about at the opening, and the front part of the shrimp and his pincers. He began pulling shells into his burrow to clear a path to the minnow. It took him a surprisingly short time to dig a nice ramp. We did not think he could move the minnow from beneath the stone. But he could. He grabbed it and whisked out of sight down the hole. And that was the last we were to see of him. The next minnow we tied to a stone with a rubber binder, but the damage was done. The shrimp had all he wanted from us.

Remembering what had happened with the jawfish and the stomatopods, we brought over mantises of assorted sizes and put them in the enclosure, hoping that they might go down into the burrow to try to steal the minnow from the burrower, and possibly even chase him out into the open. No luck. The stomatopods had no intention of going into the tunnel. Whether they were afraid, or just not in the mood, it is hard to say. Anyhow, they just lolled around on the outside and did us no good whatever.

In the evening we dropped down on one of the bay reefs for a look around. Hoped to be able to come across another cowfish that could be held so placidly in one's hand. No cowfish. But we saw the usual parrots propped against stones, and the red goatfish. When we held the light on the goatfish for a few moments, his color suddenly vanished and he was a three-spotted goatfish again. We could not determine if that indicated that he had become wide awake.

On one night dive we had seen many completely transparent little compressed fish with tiny shining headlights for eyes, and hoped to see some more. But tonight there were none. In their places were some strange creatures an inch or so long, also completely transparent except for their eyes, which appeared to be on stalks. Some of them swam directly towards the light, and others came into the circle of light and did slow somersaults. I touched one of them, expecting to come into contact with something as light as thistledown. But these creatures had shells. And the shells had sharp points. I closed my hand on one hoping that Tom would show up with the net, and the needle-sharp prong went into the palm of my hand. When I opened it the little creature was fast there, trapped by its own bayonet, kicking and struggling in its invisible suit of armor.

We netted several of them, along with a round, compressed little fish about an inch long. The front half of it was glistening silver, the back half completely transparent. I never before had seen anything like it.

When we arrived back home with our catch John told us that the transparent creatures are Lucifer shrimps. He did not know the fish. We had two of the fish, so one went into formaldehyde and the other into the aquarium, where it immediately hid behind a conch shell.

Monday, August 3. Out today for another try at the burrowing shrimp. When we arrived at our little enclosure we found that the burrow that had been its front door on Saturday now was plugged with shells, and he had a new door outside of the pen. I don't think the new hole was established as an escape route, though it could have been. In any case, we moved the enclosure a few inches, and presto, its entrance was once again inside.

This time we fastened a suitable minnow to a bit of coral and placed it where the shrimp could smell it. Immediately all the slippery dicks in the area came swimming up to have a share, and we were pleased to see them bump their noses against the glass. Glass is completely invisible to fish, and always they are greatly surprised not to be able to go through it.

Before long the shrimp came out of his den -- or at least part-way out, and began digging a ramp towards his minnow. On two or three occasions it came entirely into the clear, and I saw that it had a fan tail, like that of a lobster. It also has what appears to be a straight slash of mouth done in white. Before this one had reached the minnow I ran out of film. This really is stuff for the big camera -- when it comes.

In the evening we dropped down on a new reeflet at the mouth of the bay. There were no transparent fish, and few lucifers. But we did see one strange thread-like fish perhaps eight or ten inches long. The odd thing about it was its method of swimming. The first half of its body (we could see rib lines so we were sure it was a fish) was held horizontally in the water, but the after half of it hung down and forward so that it looked like a slender letter "V" on its side. The largest part of the body was no more than an eighth inch in diameter, I'd imagine, and the whole thing translucent. Tom brought the thin-mesh net and began gently to scoop up the tail-end of the fish, assuming (as did I) that the fish had no ability to put on any kind of speed. Naturally we were wrong. The net had no more than touched its drooping tail than it simply vanished. Neither one of us

saw it go; it simply exploded into nothing. We looked in all directions, went up and down the reef, returned again later to the same spot. It was gone. I wonder what it was.

August 4. Tuesday. Bank Holiday is over, and our non-perishable camera really was at the airport today. We received a phone call early in the morning, and Tom and I went for the camera at once. Three weeks to the day from the time I sent it winging on its way.

When we unwrapped it I found that it looked exactly as it had when it was out of commission (I always expect things to have taken on a look of shine and polish when they have been in a repair shop) but I suppose the insides of it now are back in proper relation to one another. The sound of the motor wasn't any better when I started it either. But I ran a test roll of fogged film, and all things operated. I will not feel easy until I have the results from our first rolls shot undersea.

Spent the remainder of the day hooking up the 102-mm lenses and tubes and adjusting the parallax corrector and the focussing mechanism. All things in order for a new day.

August 5. Wednesday. Ran off the close-ups of the dromid crabs today. The little fellows have been waiting patiently (I suppose) in their small cage for the three weeks the big camera has been out of business. The sea was rough, with the surge extending to the bottom, and when I pried the little fellows loose from their sponge caps they had a terrible time catching them again for they were constantly being rolled about by the push of the water. Sometimes one or the other of them would simply give

up and sit hunched on the bottom, paying no more attention to the sponge. The job was too great, and he would rather be eaten by a passing fish than to continue the battle -- and face the prospect of being forced out from under his sponge again the moment he had settled down. I didn't blame him very much. When we had finished with the pictures, we placed the little crabs carefully back in their sponge hats and settled them once more in their screen box. Must wait a film report before we can set them free.

As far as I could tell the camera was operating properly -- although it appeared to be making a good deal of racket. The cost of repairing the machine, by the way, was well over fifty dollars (in fact, it was over sixty, with a phone call to Los Angeles to find out what had happened to it), and of that amount, four dollars was the repair charge. Must be some sort of moral to this, but so far I am not quite sure what it is.

August 6. Thursday. Back for close-up shots of the burrowing shrimp today, to find out that somebody had carefully and thoroughly wrecked our small shooting enclosure. The glass sides were broken to bits and the screen top was slashed open -- apparently with a knife of some sort. The pen had nothing inside of it except a hole in the bottom occupied by the shrimp, so it was not a matter of loot. Perhaps there is someone around who simply likes to break glass.

We found that the metal framing had not been damaged, so we cleared away the debris, mended the screen top, replaced the glass, and were back again in business. And all the while I was thinking how much easier it is to understand fish than it is to understand people.

The burrowing shrimp put on a fine display for us -- moving shells, carrying buckets of sand, and finally having a row with one of the stomatopods we put into the enclosure. Actually it wasn't precisely a row. The mantis would start into the shrimp's burrow, and come rolling out again end-over-end. He tried to get into the burrow several times, with the same result on each try. Apparently the shrimp doesn't welcome visitors.

The shrimp had changed the location of his main doorway again. He has two doors now, at least two feet apart. Whichever one it is not using is kept blocked with shells. When a burrow is in use, it is very carefully bricked up with shells -- paved, actually. The jawfish builds his shells and stones into a sort of chimney, but this burrower appears rather to lay them flat against the walls and top of the tunnel. I don't know how he manages to make them stick. For the most part the shells are halves of small clams, with the concave side against the wall. The shrimp places them very carefully, and then jiggles them to settle them into place, like a mason seating a brick.

On at least two occasions Tom and I have seen what appeared to be a large shark in the bay. Once we were coiling our hose at the end of the day when Tom spotted something fifty feet or so back of the boat that I took for a moment to be a manta, until I noted the sickle fin and the notched tail a long way behind.

What kind of shark it was I have no idea. It appeared very broad at the head, quite dark in color, and not less than ten feet long. It had been swimming almost on top of the water. We hustled with our hoses at once, upped anchor, and tried to follow the fish -- we had been able

to see it for a good while -- but we failed to catch sight of it again. The next day at about noon we saw the same fellow again, and again we lost track of it.

Today Chris and Ned were out farther in the bay on the Clifton side, when they also saw a big shark. They had been swimming, but were in the boat and underway at the time. The fish was near the surface, so they pulled alongside, and paced him, pulling in until they could have reached out to touch his dorsal. The shark was just ambling along near the surface (they judged him to be about ten feet long) and appeared to be paying them no attention. But suddenly it veered to the side, turned quietly, and slammed head-on into the boat. The action was so sudden and unexpected that Chris, who was leaning over the side, came close to being spilled overboard. The shark wheeled and struck the boat again, but this time back near the stern. There was a good deal of commotion, and the shark took off at high speed. The boys thought that very probably it had got nicked by the propeller. Nobody has any notion what kind of shark it was, nor why it acted as it did. The only explanation I have is that the big fish just didn't like being pushed around. At least I hope that is the explanation.

August 7. Friday. Today some more close-ups of the burrower, and then moving the whole shebang a block or two for some of the same sort of close shots of the jawfish and the mantis shrimps. The problem was that we were short of big mantises. Chris and Ned had gone for them in the morning early, but we were just going back under water after lunch when they came along in their boat. And all they had was bad news. They had

been stuck in the sand all morning with the car, so they had done no collecting; a cable had just come from the film processor saying that my wide-angle camera had been losing the loop and putting deep scratches on the film, and I should stop using it at once. Unfortunately there are at least twelve or fourteen rolls of film run through that camera that the processor has not yet seen.

I examined the camera very carefully several days ago and found nothing amiss. I shall look again. I have three cameras, two of them were sent in for overhaul before we left Texas, and the third brand-new. The new one underexposes, loses loops, and tears out sprocket-holes; another gets damaged in the camera case; the third loses loops and scratches the film. I guess this is my year for gremlins.

August 23. Sunday. There have been so many frustrations and routine crises during the past couple of weeks that I have let my notes go by the board. It is time to pick up some of the threads.

After the cable came from Kansas City telling me to stop using #2 camera unless I could do something about it, I took out all the parts of the film transport that might be scratching or causing other troubles, examined them under a glass -- and could find nothing. But I went over them anyway with a crocus cloth in spots that could conceivably carry a rough edge, and ended with a thin application of silicone to make all as slick as possible. At the end of the first reel after this treatment, I found the loop gone, and the film lined with deep scratches. Par for the course.

So I phoned a camera dealer in Nassau, and much to my surprise, found that he carried a Bolex 16-mm in stock -- one that I could purchase without lenses. Some of the fittings on the new camera differed from the one I had been using, but after a half-day of tinkering and adjusting, the new camera (hereafter to be known as #5) was in the undersea housing and ready for business. It had only one fault -- without film in it the camera sounded smooth as silk; but with a load of film in its teeth it rumbled like a lumber wagon. Nothing to do but use it anyway; I could see nothing wrong with it, and it apparently did not lose its loop. I checked everything checkable, could find nothing wrong, and put it to work -- with my fingers crossed.

Reports were coming in from the film processor. My #2 camera (now retired) had lost the loop on eight hundred feet of film, with more still unaccounted for. Much of it could not be re-shot. One of the rolls had been our tests of the latest batch of film, the medium speed (MS) Ektachrome. But we had used up our supply of Commercial, and there was nothing to do but begin shooting the MS without tests. The print from some of our night shots had come in and was almost brown from lack of proper filtering, so we added a blue filter for the night work. Consequently, we were then shooting with an untried camera on an untested film with an untested filter. In view of the astounding lack of success in many directions this summer, that could be called a very long shot. But as usual we had no choice.

Our close-up camera (#3) was sounding very queer, although it had just returned from surgery, but I could find no evidence that it was losing

its loop or scratching the film -- it ran. With minor mishaps it ran, of course. Several days ago it stopped solid one night when I was trying to photograph coral polyps feeding. Upon examination I found a simple explanation -- there was at least a cupful of water in the camera case. None of it had touched the camera, but the dampness had affected the emulsion, and the film was in a snarl.

That is the first time in fifteen years that water has got into the inside of one of my camera housings. One of the packing glands had loosened, and I had not seen the bubbles....carelessness.

I dried out the case, slicked up the camera, put drying crystals in the housing, and put the camera back on the job. This time I banged it on the side of the boat as I lowered it. It was not a bad bump, but I realized the parallax corrector was not operating. Up in the boat I adjusted the parallax arm, and in turning the focussing knob I broke the cable that operates the lenses. That took care of that. The bump on the side of the boat had jarred the finder out of position, causing it to jam, and that was why the parallax-corrector didn't operate -- I learned later.

I repaired the cable, re-set the finder, re-checked the focus, and tried once more. This time the camera lost its loop at once and refused to budge. So far, I do not know why. Also a soldering connection on the focussing collar suddenly let go -- for no reason that I can think of; there is no strain on it. The collar is mended now, but not installed. But whether the camera will run or not is another thing. It has not chugged through more than six or eight rolls of film since its return from California, but I think I know the answer to such a question: this

is the year of the gremlins. The camera probably will not run. If it runs, it will lose the loop; if it does not lose the loop it will scratch the film; if it does not scratch the film it will be out of focus; if none of these things happens, the exposure will be wrong.

We had used up all of our MS before the report on it came in -- yesterday. It turned out to have been underexposed somewhat -- but printable. Well, that long shot paid off. We have something less than eight rolls of film remaining -- four commercial for topside, and four of faster for night work. But we may end by not using them for their intended purposes. A hurricane is building up to the Southeast of us (Cleo) and may pay us a call within the next three days or so. This almost exactly coincides with our sailing date -- Thursday. I shall save the film until the forecasters have a little more data on the storm. It is possible that it may be used to record the actions of a hurricane.

Aside from camera breakdowns and malfunctions we actually have been using film on some of the undersea creatures. Most of it has been routine. We backed up and made close-ups of some of the small things -- mantises, burrowing shrimps, dromids -- that we had missed when #3 was out of commission. Our octopus remained in the shooting enclosure -- I am sure he could have escaped if he had set his mind to it -- and we made him a final offer of the very big crab with which he had battled on a previous occasion. This time he must have been very hungry, for the crab fell at the first blow. I was sorry to see him go.

A couple of days ago when we were about to begin taking the pens apart we carried the octopus to a spot a short distance away where another octopus had a residence. Tom placed our octo on the grass near the small coral head. The octo headed for it as a good shelter, but the one in residence flailed out at him with